

# **Appendix A**

## **Technology Data Sheets**

**TECHNOLOGY: Wind**

Island Hawaii Location Lalamilo Wells Project Code: (leave blank)

Capacity (MW)	<u>3</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>22.06</u>	Extent (# of units)	<u>4</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	16,162	14,692	13,223
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>14,539</u>	<u>12,483</u>	<u>10,573</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	2,623,950	2,677,500	2,731,050
Foundations	228,458	233,120	237,782
Assembly & Checkout	78,400	80,000	81,600
Electrical Infrastructure	260,876	266,200	271,524
Sub-Station	147,000	150,000	153,000
Overseas Shipping	98,000	100,000	102,000
Legal Fees & Permitting	284,778	355,973	444,966

*General Facilities*

Roads & Grading	36,027	36,762	37,497
Control System	23,520	24,000	24,480
Control Buildings	9,408	9,600	9,792
Central Building	10,710	11,900	14,875

<i>Engineering &amp; Overhead</i>	260,502	270,395	281,535
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<i>Project Contingency</i>	324,930	337,236	351,208
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<i>Initial Costs</i>	221,885	227,275	232,932
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SUB-TOTAL	<u>\$ 4,608,444</u>	<u>\$ 4,779,961</u>	<u>\$ 4,974,241</u>
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**TRANSMISSION**

Cost of Upgrade	<u></u>	<u></u>	<u></u>
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**ANNUAL EXPENSES**

Variable O&M	26,170	24,966	23,261
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Fixed O&M	27,473	27,750	28,028
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Land Lease	5,016	5,280	5,544
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FIRST YEAR O&M	<u>\$ 58,659</u>	<u>\$ 57,996</u>	<u>\$ 56,833</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location Lalamilo Wells Project Code: (leave blank)

Capacity (MW)	<u>30</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>22.06</u>	Extent (# of units)	<u>40</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	161,616	146,924	132,231
Expected Losses (%)	19%	24%	29%
Net Energy (MWh/yr)	<u>131,088</u>	<u>111,825</u>	<u>94,031</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	24,990,000	25,500,000	26,010,000
Foundations	2,284,576	2,331,200	2,377,824
Assembly & Checkout	784,000	800,000	816,000
Electrical Infrastructure	2,608,760	2,662,000	2,715,240
Sub-Station	1,470,000	1,500,000	1,530,000
Overseas Shipping	980,000	1,000,000	1,020,000
Legal Fees & Permitting	346,673	433,341	541,676

*General Facilities*

Roads & Grading	311,140	317,490	323,840
Control System	235,200	240,000	244,800
Control Buildings	94,080	96,000	97,920
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	2,342,481	2,395,858	2,450,752
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<i>Project Contingency</i>	2,922,204	2,989,239	3,059,204
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<i>Initial Costs</i>	2,073,412	2,112,880	2,151,932
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SUB-TOTAL	<u>\$41,523,166</u>	<u>\$42,467,608</u>	<u>\$43,451,187</u>
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**TRANSMISSION**

Cost of Upgrade	<u>1,960,000</u>	<u>2,000,000</u>	<u>2,040,000</u>
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**ANNUAL EXPENSES**

Variable O&M	235,958	223,649	206,868
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Fixed O&M	274,725	277,500	280,275
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Land Lease	50,160	52,800	55,440
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FIRST YEAR O&M	<u>\$ 560,843</u>	<u>\$ 553,949</u>	<u>\$ 542,583</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location Lalamilo Wells Project Code: (leave blank)

Capacity (MW)	<u>50</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>22.06</u>	Extent (# of units)	<u>66</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	266,667	242,424	218,182
Expected Losses (%)	19%	24%	29%
Net Energy (MWh/yr)	<u>216,295</u>	<u>184,511</u>	<u>155,151</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	40,408,830	41,233,500	42,058,170
Foundations	3,769,550	3,846,480	3,923,410
Assembly & Checkout	1,293,600	1,320,000	1,346,400
Electrical Infrastructure	4,304,454	4,392,300	4,480,146
Sub-Station	2,450,000	2,500,000	2,550,000
Overseas Shipping	1,617,000	1,650,000	1,683,000
Legal Fees & Permitting	389,813	487,266	609,083

*General Facilities*

Roads & Grading	509,833	520,238	530,643
Control System	388,080	396,000	403,920
Control Buildings	155,232	158,400	161,568
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	3,796,327	3,880,068	3,965,515
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<i>Project Contingency</i>	4,733,069	4,837,908	4,945,908
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<i>Initial Costs</i>	3,359,130	3,422,055	3,483,891
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SUB-TOTAL	<u>\$67,255,559</u>	<u>\$68,733,816</u>	<u>\$70,253,653</u>
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**TRANSMISSION**

Cost of Upgrade	<u>1,960,000</u>	<u>2,000,000</u>	<u>2,040,000</u>
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**ANNUAL EXPENSES**

Variable O&M	389,331	369,022	341,331
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Fixed O&M	453,296	457,875	462,454
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Land Lease	82,764	87,120	91,476
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FIRST YEAR O&M	<u>\$ 925,392</u>	<u>\$ 914,017</u>	<u>\$ 895,261</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location North Kohala Project Code: (leave blank)

Capacity (MW)	<u>5</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>23.43</u>	Extent (# of units)	<u>6</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	25,961	23,601	21,241
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>23,354</u>	<u>20,051</u>	<u>16,984</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	3,935,925	4,016,250	4,096,575
Foundations	376,955	384,648	392,341
Assembly & Checkout	117,600	120,000	122,400
Electrical Infrastructure	391,314	399,300	407,286
Sub-Station	245,000	250,000	255,000
Overseas Shipping	147,000	150,000	153,000
Legal Fees & Permitting	288,543	360,679	450,848

*General Facilities*

Roads & Grading	57,861	59,042	60,223
Control System	35,280	36,000	36,720
Control Buildings	14,112	14,400	14,688
Central Building	37,620	41,800	52,250

<i>Engineering &amp; Overhead</i>	385,164	397,661	411,422
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<i>Project Contingency</i>	482,590	498,382	516,220
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<i>Initial Costs</i>	336,195	343,827	351,744
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SUB-TOTAL	<u>\$ 6,851,159</u>	<u>\$ 7,071,989</u>	<u>\$ 7,320,717</u>
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**TRANSMISSION**

Cost of Upgrade	<u>352,800</u>	<u>360,000</u>	<u>367,200</u>
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**ANNUAL EXPENSES**

Variable O&M	42,038	40,102	37,365
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Fixed O&M	41,209	41,625	42,041
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Land Lease	22,572	23,760	24,948
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FIRST YEAR O&M	<u>\$ 105,819</u>	<u>\$ 105,487</u>	<u>\$ 104,354</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location North Kohala Project Code: (leave blank)

Capacity (MW)	<u>15</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>23.43</u>	Extent (# of units)	<u>20</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	86,535	78,669	70,802
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>77,848</u>	<u>66,837</u>	<u>56,614</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	12,495,000	12,750,000	13,005,000
Foundations	1,256,517	1,282,160	1,307,803
Assembly & Checkout	392,000	400,000	408,000
Electrical Infrastructure	1,304,380	1,331,000	1,357,620
Sub-Station	735,000	750,000	765,000
Overseas Shipping	490,000	500,000	510,000
Legal Fees & Permitting	312,509	390,636	488,296

*General Facilities*

Roads & Grading	180,134	183,810	187,486
Control System	117,600	120,000	122,400
Control Buildings	47,040	48,000	48,960
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	1,188,978	1,218,266	1,248,920
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<i>Project Contingency</i>	1,487,984	1,525,078	1,564,919
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<i>Initial Costs</i>	1,061,149	1,082,310	1,103,463
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SUB-TOTAL	<u>\$21,148,931</u>	<u>\$21,670,860</u>	<u>\$22,229,867</u>
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**TRANSMISSION**

Cost of Upgrade	<u>2,940,000</u>	<u>3,000,000</u>	<u>3,060,000</u>
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**ANNUAL EXPENSES**

Variable O&M	140,126	133,675	124,550
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Fixed O&M	137,363	138,750	140,138
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Land Lease	75,240	79,200	83,160
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FIRST YEAR O&M	<u>\$ 352,729</u>	<u>\$ 351,625</u>	<u>\$ 347,848</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location Kahua Ranch Project Code: (leave blank)

Capacity (MW)	<u>10</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>18.3</u>	Extent (# of units)	<u>13</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	45,448	41,316	37,185
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>40,885</u>	<u>35,103</u>	<u>29,733</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	9,077,250	9,262,500	9,447,750
Foundations	742,487	757,640	772,793
Assembly & Checkout	254,800	260,000	265,200
Electrical Infrastructure	847,847	865,150	882,453
Sub-Station	490,000	500,000	510,000
Overseas Shipping	318,500	325,000	331,500
Legal Fees & Permitting	314,428	393,035	491,294

*General Facilities*

Roads & Grading	104,805	106,944	109,083
Control System	76,440	78,000	79,560
Control Buildings	30,576	31,200	31,824
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	843,172	865,433	889,069
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<i>Project Contingency</i>	1,054,476	1,353,450	1,113,802
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<i>Initial Costs</i>	753,213	965,060	785,307
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SUB-TOTAL	<u>\$14,988,634</u>	<u>\$15,853,013</u>	<u>\$15,821,635</u>
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**TRANSMISSION**

Cost of Upgrade	<u>784,000</u>	<u>800,000</u>	<u>816,000</u>
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**ANNUAL EXPENSES**

Variable O&M	73,593	81,000	65,413
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Fixed O&M	89,286	90,188	91,089
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Land Lease	47,500	50,000	52,500
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FIRST YEAR O&M	<u>\$ 210,379</u>	<u>\$ 221,188</u>	<u>\$ 209,002</u>
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**TECHNOLOGY: Wind**

Island Maui Location McGregor Point Project Code: (leave blank)

Capacity (MW)	<u>20.25</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>20</u>	Extent (# of units)	<u>27</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	97,862	88,965	80,069
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>88,037</u>	<u>75,585</u>	<u>64,023</u>

**CAPITAL COSTS**

*Process Capital*

Turbines & Towers	18,852,750	19,237,500	19,622,250
Foundations	1,696,298	1,730,916	1,765,534
Assembly & Checkout	529,200	540,000	550,800
Electrical Infrastructure	2,347,884	2,395,800	2,443,716
Sub-Station	992,250	1,012,500	1,032,750
Overseas Shipping	661,500	675,000	688,500
Legal Fees & Permitting	356,304	445,379	556,724

*General Facilities*

Roads & Grading	319,874	326,402	332,930
Control System	158,760	162,000	165,240
Control Buildings	63,504	64,800	66,096
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	1,780,533	1,822,597	1,866,219
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<i>Project Contingency</i>	2,227,160	2,850,249	2,336,221
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<i>Initial Costs</i>	1,567,606	2,004,598	1,630,040
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SUB-TOTAL	<u>\$31,634,262</u>	<u>\$33,357,341</u>	<u>\$33,169,021</u>
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**TRANSMISSION**

Cost of Upgrade	<u>686,000</u>	<u>700,000</u>	<u>714,000</u>
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**ANNUAL EXPENSES**

Variable O&M	158,467	146,250	140,852
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Fixed O&M	185,439	187,313	189,186
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Land Lease	71,250	75,000	78,750
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FIRST YEAR O&M	<u>\$ 415,156</u>	<u>\$ 408,563</u>	<u>\$ 408,787</u>
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**TECHNOLOGY: Wind**

Island Maui Location NW Haleakala Project Code: (leave blank)

Capacity (MW)	<u>10</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>17.42</u>	Extent (# of units)	<u>13</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	38,586	35,078	31,570
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>34,712</u>	<u>29,803</u>	<u>25,244</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	8,121,750	8,287,500	8,453,250
Foundations	742,487	757,640	772,793
Assembly & Checkout	254,800	260,000	265,200
Electrical Infrastructure	847,847	865,150	882,453
Sub-Station	490,000	500,000	510,000
Overseas Shipping	318,500	325,000	331,500
Legal Fees & Permitting	300,202	375,253	469,066

*General Facilities*

Roads & Grading	104,805	106,944	109,083
Control System	76,440	78,000	79,560
Control Buildings	30,576	31,200	31,824
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	775,291	795,938	817,898
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<i>Project Contingency</i>	971,467	997,778	1,026,770
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<i>Initial Costs</i>	683,617	698,219	713,167
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SUB-TOTAL	<u>\$13,798,422</u>	<u>\$14,168,221</u>	<u>\$14,574,564</u>
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**TRANSMISSION**

Cost of Upgrade	<u></u>	<u></u>	<u></u>
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**ANNUAL EXPENSES**

Variable O&M	62,482	59,605	55,537
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Fixed O&M	89,286	90,188	91,089
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Land Lease	48,906	51,480	54,054
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FIRST YEAR O&M	<u>\$ 200,674</u>	<u>\$ 201,273</u>	<u>\$ 200,680</u>
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**TECHNOLOGY: Wind**

Island Maui Location NW Haleakala Project Code: (leave blank)

Capacity (MW)	<u>30</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>17.42</u>	Extent (# of units)	<u>40</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	118,726	107,933	97,139
Expected Losses (%)	19%	24%	29%
Net Energy (MWh/yr)	<u>96,300</u>	<u>82,148</u>	<u>69,077</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	24,990,000	25,500,000	26,010,000
Foundations	2,284,576	2,331,200	2,377,824
Assembly & Checkout	784,000	800,000	816,000
Electrical Infrastructure	2,608,760	2,662,000	2,715,240
Sub-Station	1,470,000	1,500,000	1,530,000
Overseas Shipping	980,000	1,000,000	1,020,000
Legal Fees & Permitting	346,673	433,341	541,676

*General Facilities*

Roads & Grading	311,140	317,490	323,840
Control System	235,200	240,000	244,800
Control Buildings	94,080	96,000	97,920
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	2,342,481	2,395,858	2,450,752
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<i>Project Contingency</i>	2,922,204	2,989,239	3,059,204
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<i>Initial Costs</i>	2,082,837	2,124,442	2,165,927
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SUB-TOTAL	<u>\$41,532,591</u>	<u>\$42,479,169</u>	<u>\$43,465,183</u>
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**TRANSMISSION**

Cost of Upgrade	<u>2,940,000</u>	<u>3,000,000</u>	<u>3,060,000</u>
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**ANNUAL EXPENSES**

Variable O&M	173,339	164,297	151,969
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Fixed O&M	274,725	277,500	280,275
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Land Lease	150,480	158,400	166,320
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FIRST YEAR O&M	<u>\$ 598,544</u>	<u>\$ 600,197</u>	<u>\$ 598,564</u>
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**TECHNOLOGY: Wind**

Island Maui Location NW Haleakala Project Code: (leave blank)

Capacity (MW)	<u>50</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>17.42</u>	Extent (# of units)	<u>66</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	195,898	178,089	160,280
Expected Losses (%)	19%	24%	29%
Net Energy (MWh/yr)	<u>158,894</u>	<u>135,545</u>	<u>113,976</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	40,408,830	41,233,500	42,058,170
Foundations	3,769,550	3,846,480	3,923,410
Assembly & Checkout	1,293,600	1,320,000	1,346,400
Electrical Infrastructure	4,304,454	4,392,300	4,480,146
Sub-Station	2,450,000	2,500,000	2,550,000
Overseas Shipping	1,617,000	1,650,000	1,683,000
Legal Fees & Permitting	389,813	487,266	609,083

*General Facilities*

Roads & Grading	509,833	520,238	530,643
Control System	388,080	396,000	403,920
Control Buildings	155,232	158,400	161,568
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	3,796,327	3,880,068	3,965,515
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<i>Project Contingency</i>	4,733,069	4,837,908	4,945,908
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<i>Initial Costs</i>	3,374,682	3,441,132	3,506,983
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SUB-TOTAL	<u>\$67,271,110</u>	<u>\$68,752,893</u>	<u>\$70,276,745</u>
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**TRANSMISSION**

Cost of Upgrade	<u>2,940,000</u>	<u>3,000,000</u>	<u>3,060,000</u>
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**ANNUAL EXPENSES**

Variable O&M	286,010	271,090	250,748
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Fixed O&M	453,296	457,875	462,454
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Land Lease	248,292	261,360	274,428
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FIRST YEAR O&M	<u>\$ 987,598</u>	<u>\$ 990,325</u>	<u>\$ 987,630</u>
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**TECHNOLOGY: Wind**

Island Maui Location Puunene Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>10</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>14.65</u>	Extent (# of units)	<u>13</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	28,829	26,208	23,587
Expected Losses (%)	15%	20%	25%
Net Energy (MWh/yr)	<u>24,404</u>	<u>20,875</u>	<u>17,608</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	8,121,750	8,287,500	8,453,250
Foundations	816,736	833,404	850,072
Assembly & Checkout	254,800	260,000	265,200
Electrical Infrastructure	847,847	865,150	882,453
Sub-Station	490,000	500,000	510,000
Overseas Shipping	318,500	325,000	331,500
Legal Fees & Permitting	300,383	375,478	469,348

*General Facilities*

Roads & Grading	118,997	121,426	123,855
Control System	76,440	78,000	79,560
Control Buildings	30,576	31,200	31,824
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	780,501	801,257	823,328
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<i>Project Contingency</i>	978,974	1,005,441	1,034,591
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<i>Initial Costs</i>	672,600	686,985	701,805
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SUB-TOTAL	<u>\$13,888,743</u>	<u>\$14,260,441</u>	<u>\$14,668,785</u>
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**TRANSMISSION**

Cost of Upgrade	<u>                    </u>	<u>                    </u>	<u>                    </u>
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**ANNUAL EXPENSES**

Variable O&M	43,927	41,750	38,738
Fixed O&M	89,286	90,188	91,089
Land Lease	16,302	17,160	18,018
FIRST YEAR O&M	<u>\$ 149,515</u>	<u>\$ 149,098</u>	<u>\$ 147,845</u>

**TECHNOLOGY: Wind**

Island Maui Location Puunene Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>30</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>14.65</u>	Extent (# of units)	<u>40</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	88,705	80,641	72,577
Expected Losses (%)	19%	24%	29%
Net Energy (MWh/yr)	<u>71,949</u>	<u>61,376</u>	<u>51,610</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	24,990,000	25,500,000	26,010,000
Foundations	2,513,034	2,564,320	2,615,606
Assembly & Checkout	784,000	800,000	816,000
Electrical Infrastructure	2,608,760	2,662,000	2,715,240
Sub-Station	1,470,000	1,500,000	1,530,000
Overseas Shipping	980,000	1,000,000	1,020,000
Legal Fees & Permitting	347,228	434,035	542,544

*General Facilities*

Roads & Grading	354,809	362,050	369,291
Control System	235,200	240,000	244,800
Control Buildings	94,080	96,000	97,920
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	2,358,512	2,412,225	2,467,457
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<i>Project Contingency</i>	2,945,301	3,012,818	3,083,269
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<i>Initial Costs</i>	2,052,253	2,093,223	2,134,282
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SUB-TOTAL	<u>\$41,813,816</u>	<u>\$42,766,271</u>	<u>\$43,758,409</u>
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**TRANSMISSION**

Cost of Upgrade	<u>2,940,000</u>	<u>3,000,000</u>	<u>3,060,000</u>
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**ANNUAL EXPENSES**

Variable O&M	129,508	122,752	113,541
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Fixed O&M	274,725	277,500	280,275
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Land Lease	50,160	52,800	55,440
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FIRST YEAR O&M	<u>\$ 454,393</u>	<u>\$ 453,052</u>	<u>\$ 449,256</u>
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**TECHNOLOGY: Wind**

Island Oahu Location Kahuku Project Code: (leave blank)

Capacity (MW)	<u>30</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>17.53</u>	Extent (# of units)	<u>40</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	110,500	100,454	90,409
Expected Losses (%)	19%	24%	29%
Net Energy (MWh/yr)	<u>89,627</u>	<u>76,456</u>	<u>64,290</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	24,990,000	25,500,000	26,010,000
Foundations	2,513,034	2,564,320	2,615,606
Assembly & Checkout	784,000	800,000	816,000
Electrical Infrastructure	2,956,595	3,016,933	3,077,272
Sub-Station	1,470,000	1,500,000	1,530,000
Overseas Shipping	980,000	1,000,000	1,020,000
Legal Fees & Permitting	348,033	435,041	543,801

*General Facilities*

Roads & Grading	401,389	409,581	417,772
Control System	235,200	240,000	244,800
Control Buildings	94,080	96,000	97,920
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	2,382,916	2,437,141	2,492,888
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<i>Project Contingency</i>	2,978,871	3,047,089	3,118,245
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<i>Initial Costs</i>	2,093,193	2,135,233	2,177,212
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SUB-TOTAL	<u>\$42,307,950</u>	<u>\$43,270,938</u>	<u>\$44,273,516</u>
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**TRANSMISSION**

Cost of Upgrade	<u>882,000</u>	<u>900,000</u>	<u>918,000</u>
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**ANNUAL EXPENSES**

Variable O&M	161,329	152,913	141,439
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Fixed O&M	274,725	277,500	280,275
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Land Lease	150,480	158,400	166,320
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FIRST YEAR O&M	<u>\$ 586,534</u>	<u>\$ 588,813</u>	<u>\$ 588,034</u>
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**TECHNOLOGY: Wind**

Island Oahu Location Kahuku Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>50</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>17.53</u>	Extent (# of units)	<u>66</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	182,324	165,749	149,174
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>164,020</u>	<u>140,822</u>	<u>119,281</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	40,408,830	41,233,500	42,058,170
Foundations	4,146,505	4,231,128	4,315,751
Assembly & Checkout	1,293,600	1,320,000	1,346,400
Electrical Infrastructure	4,878,381	4,977,940	5,077,499
Sub-Station	2,450,000	2,500,000	2,550,000
Overseas Shipping	1,617,000	1,650,000	1,683,000
Legal Fees & Permitting	392,058	490,072	612,590

*General Facilities*

Roads & Grading	658,744	672,188	685,631
Control System	388,080	396,000	403,920
Control Buildings	155,232	158,400	161,568
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	3,863,046	3,948,185	4,035,039
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<i>Project Contingency</i>	4,826,569	4,933,361	5,043,325
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<i>Initial Costs</i>	3,399,029	3,466,271	3,532,864
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SUB-TOTAL	<u>\$68,557,715</u>	<u>\$70,066,645</u>	<u>\$71,617,757</u>
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**TRANSMISSION**

Cost of Upgrade	<u>1,960,000</u>	<u>2,000,000</u>	<u>2,040,000</u>
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**ANNUAL EXPENSES**

Variable O&M	295,237	281,644	262,418
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Fixed O&M	453,296	457,875	462,454
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Land Lease	248,292	261,360	274,428
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FIRST YEAR O&M	<u>\$ 996,825</u>	<u>\$ 1,000,879</u>	<u>\$ 999,300</u>
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**TECHNOLOGY: Wind**

Island Oahu Location Kahuku Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>80</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>17.53</u>	Extent (# of units)	<u>106</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	292,824	266,203	239,583
Expected Losses (%)	19%	24%	29%
Net Energy (MWh/yr)	<u>237,512</u>	<u>202,609</u>	<u>170,369</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	64,899,030	66,223,500	67,547,970
Foundations	6,659,539	6,795,448	6,931,357
Assembly & Checkout	2,077,600	2,120,000	2,162,400
Electrical Infrastructure	7,834,976	7,994,873	8,154,771
Sub-Station	3,920,000	4,000,000	4,080,000
Overseas Shipping	2,597,000	2,650,000	2,703,000
Legal Fees & Permitting	461,280	576,600	720,750

*General Facilities*

Roads & Grading	1,054,674	1,076,198	1,097,722
Control System	623,280	636,000	648,720
Control Buildings	249,312	254,400	259,488
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	6,191,460	6,325,229	6,461,017
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<i>Project Contingency</i>	7,731,903	7,899,348	8,070,336
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<i>Initial Costs</i>	5,442,677	5,549,596	5,655,334
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SUB-TOTAL	<u>\$109,823,371</u>	<u>\$112,190,793</u>	<u>\$114,604,865</u>
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**TRANSMISSION**

Cost of Upgrade	<u>8,820,000</u>	<u>9,000,000</u>	<u>9,180,000</u>
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**ANNUAL EXPENSES**

Variable O&M	427,521	405,219	374,812
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Fixed O&M	728,021	735,375	742,729
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Land Lease	398,772	419,760	440,748
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FIRST YEAR O&M	<u>\$ 1,554,314</u>	<u>\$ 1,560,354</u>	<u>\$ 1,558,289</u>
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**TECHNOLOGY: Wind**

Island Oahu Location Kaena Point Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>3</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>16.74</u>	Extent (# of units)	<u>4</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	OPTIMISTIC	NOMINAL	CONSERVATIVE
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	10,508	9,553	8,598
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>9,453</u>	<u>8,116</u>	<u>6,875</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	2,623,950	2,677,500	2,731,050
Foundations	228,458	233,120	237,782
Assembly & Checkout	78,400	80,000	81,600
Electrical Infrastructure	347,835	354,933	362,032
Sub-Station	147,000	150,000	153,000
Overseas Shipping	98,000	100,000	102,000
Legal Fees & Permitting	284,976	356,221	445,276

*General Facilities*

Roads & Grading	46,216	47,159	48,103
Control System	23,520	24,000	24,480
Control Buildings	9,408	9,600	9,792
Central Building	10,710	11,900	14,875

<i>Engineering &amp; Overhead</i>	266,603	276,624	287,892
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<i>Project Contingency</i>	333,206	345,685	359,831
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<i>Initial Costs</i>	221,543	227,079	232,926
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SUB-TOTAL	<u>\$ 4,719,825</u>	<u>\$ 4,893,821</u>	<u>\$ 5,090,638</u>
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**TRANSMISSION**

Cost of Upgrade	<u>                    </u>	<u>                    </u>	<u>                    </u>
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**ANNUAL EXPENSES**

Variable O&M	17,016	16,233	15,125
Fixed O&M	27,473	27,750	28,028
Land Lease	5,016	5,280	5,544

FIRST YEAR O&M	<u>\$ 49,505</u>	<u>\$ 49,263</u>	<u>\$ 48,696</u>
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**TECHNOLOGY: Wind**

Island Oahu Location Kaena Point Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>15</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>16.74</u>	Extent (# of units)	<u>20</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	52,542	47,765	42,989
Expected Losses (%)	15%	20%	25%
Net Energy (MWh/yr)	<u>44,477</u>	<u>38,046</u>	<u>32,092</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	12,495,000	12,750,000	13,005,000
Foundations	1,142,288	1,165,600	1,188,912
Assembly & Checkout	392,000	400,000	408,000
Electrical Infrastructure	1,739,173	1,774,667	1,810,160
Sub-Station	735,000	750,000	765,000
Overseas Shipping	490,000	500,000	510,000
Legal Fees & Permitting	313,223	391,528	489,411

*General Facilities*

Roads & Grading	209,246	213,517	217,787
Control System	117,600	120,000	122,400
Control Buildings	47,040	48,000	48,960
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	1,211,468	1,241,226	1,272,354
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<i>Project Contingency</i>	1,517,814	1,555,531	1,595,999
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<i>Initial Costs</i>	1,040,600	1,061,869	1,083,417
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SUB-TOTAL	<u>\$21,531,092</u>	<u>\$22,061,537</u>	<u>\$22,629,399</u>
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**TRANSMISSION**

Cost of Upgrade	<u>1,470,000</u>	<u>1,500,000</u>	<u>1,530,000</u>
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**ANNUAL EXPENSES**

Variable O&M	80,059	76,091	70,601
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Fixed O&M	137,363	138,750	140,138
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Land Lease	25,080	26,400	27,720
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FIRST YEAR O&M	<u>\$ 242,501</u>	<u>\$ 241,241</u>	<u>\$ 238,459</u>
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**TECHNOLOGY: Wind**

Island Kauai Location N. Hanapepe Project Code: (leave blank)

Capacity (MW)	<u>10</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>17.08</u>	Extent (# of units)	<u>13</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	32,657	29,688	26,719
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>29,378</u>	<u>25,223</u>	<u>21,365</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	8,121,750	8,287,500	8,453,250
Foundations	816,736	833,404	850,072
Assembly & Checkout	254,800	260,000	265,200
Electrical Infrastructure	1,130,463	1,153,533	1,176,604
Sub-Station	490,000	500,000	510,000
Overseas Shipping	318,500	325,000	331,500
Legal Fees & Permitting	301,037	376,296	470,370

*General Facilities*

Roads & Grading	156,844	160,045	163,246
Control System	76,440	78,000	79,560
Control Buildings	30,576	31,200	31,824
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	800,330	821,501	843,990
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<i>Project Contingency</i>	1,006,249	1,033,286	1,063,009
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<i>Initial Costs</i>	689,411	704,295	719,572
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SUB-TOTAL	<u>\$14,273,775</u>	<u>\$14,653,660</u>	<u>\$15,070,196</u>
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**TRANSMISSION**

Cost of Upgrade	<u></u>	<u></u>	<u></u>
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**ANNUAL EXPENSES**

Variable O&M	52,881	50,447	47,003
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Fixed O&M	89,286	90,188	91,089
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Land Lease	48,906	51,480	54,054
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FIRST YEAR O&M	<u>\$ 191,073</u>	<u>\$ 192,114</u>	<u>\$ 192,146</u>
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**TECHNOLOGY: Wind**

Island Kauai Location Port Allen Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>5</u>	Stage (current/future)	<u>Current</u>
Resource (mph, avg.)	<u>15.8</u>	Extent (# of units)	<u>6</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	OPTIMISTIC	NOMINAL	CONSERVATIVE
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	13,945	12,677	11,410
Expected Losses (%)	10%	15%	20%
Net Energy (MWh/yr)	<u>12,545</u>	<u>10,771</u>	<u>9,123</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	3,935,925	4,016,250	4,096,575
Foundations	342,686	349,680	356,674
Assembly & Checkout	117,600	120,000	122,400
Electrical Infrastructure	391,314	399,300	407,286
Sub-Station	245,000	250,000	255,000
Overseas Shipping	147,000	150,000	153,000
Legal Fees & Permitting	288,460	360,574	450,718

*General Facilities*

Roads & Grading	51,311	52,358	53,405
Control System	35,280	36,000	36,720
Control Buildings	14,112	14,400	14,688
Central Building	37,620	41,800	52,250

<i>Engineering &amp; Overhead</i>	382,759	395,206	408,916
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<i>Project Contingency</i>	479,125	494,846	512,611
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<i>Initial Costs</i>	326,751	334,391	342,410
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SUB-TOTAL	<u>\$ 6,794,943</u>	<u>\$ 7,014,806</u>	<u>\$ 7,262,652</u>
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**TRANSMISSION**

Cost of Upgrade	<u>                    </u>	<u>                    </u>	<u>                    </u>
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**ANNUAL EXPENSES**

Variable O&M	22,581	21,541	20,071
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Fixed O&M	41,209	41,625	42,041
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Land Lease	7,524	7,920	8,316
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FIRST YEAR O&M	<u>\$ 71,314</u>	<u>\$ 71,086</u>	<u>\$ 70,428</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location Lalamilo Wells Project Code: (leave blank)

Capacity (MW)	<u>3</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>22.06</u>	Extent (# of units)	<u>2</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	18,586	16,896	15,207
Expected Losses (%)	9%	14%	19%
Net Energy (MWh/yr)	<u>16,969</u>	<u>14,582</u>	<u>12,363</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	2,409,750	2,677,500	3,079,125
Foundations	182,766	186,496	190,226
Assembly & Checkout	78,400	80,000	81,600
Electrical Infrastructure	242,876	247,832	252,789
Sub-Station	147,000	150,000	153,000
Overseas Shipping	98,000	100,000	102,000
Legal Fees & Permitting	284,607	355,759	444,698

*General Facilities*

Roads & Grading	29,913	30,524	31,134
Control System	11,760	12,000	12,240
Control Buildings	7,056	7,200	7,344
Central Building	10,710	11,900	14,875

<i>Engineering &amp; Overhead</i>	241,038	270,145	301,241
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<i>Project Contingency</i>	299,510	330,348	373,622
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<i>Initial Costs</i>	205,765	222,664	255,980
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SUB-TOTAL	<u>\$ 4,249,151</u>	<u>\$ 4,682,367</u>	<u>\$ 5,299,874</u>
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**TRANSMISSION**

Cost of Upgrade	<u></u>	<u></u>	<u></u>
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**ANNUAL EXPENSES**

Variable O&M	29,934	28,580	26,655
Fixed O&M	26,923	13,598	27,467
Land Lease	4,028	4,240	4,452
FIRST YEAR O&M	<u>\$ 60,885</u>	<u>\$ 46,418</u>	<u>\$ 58,574</u>

**TECHNOLOGY: Wind**

Island Hawaii Location Lalamilo Wells Project Code: (leave blank)

Capacity (MW)	<u>30</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>22.06</u>	Extent (# of units)	<u>20</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	185,859	168,962	152,066
Expected Losses (%)	16%	21%	26%
Net Energy (MWh/yr)	<u>155,565</u>	<u>132,974</u>	<u>112,074</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	22,950,000	25,500,000	29,325,000
Foundations	1,827,661	1,864,960	1,902,259
Assembly & Checkout	784,000	800,000	816,000
Electrical Infrastructure	2,428,756	2,478,322	2,527,888
Sub-Station	1,470,000	1,500,000	1,530,000
Overseas Shipping	980,000	1,000,000	1,020,000
Legal Fees & Permitting	344,960	431,200	539,000

*General Facilities*

Roads & Grading	250,004	255,106	260,208
Control System	117,600	120,000	122,400
Control Buildings	70,560	72,000	73,440
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	2,154,976	2,387,783	2,636,210
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<i>Project Contingency</i>	2,676,733	2,919,918	3,269,152
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<i>Initial Costs</i>	1,919,565	2,106,975	2,371,019
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SUB-TOTAL	<u>\$38,055,454</u>	<u>\$41,525,864</u>	<u>\$46,504,577</u>
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**TRANSMISSION**

Cost of Upgrade	<u>1,960,000</u>	<u>2,000,000</u>	<u>2,040,000</u>
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**ANNUAL EXPENSES**

Variable O&M	274,416	260,630	241,631
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Fixed O&M	269,231	135,975	274,670
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Land Lease	40,280	42,400	44,520
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FIRST YEAR O&M	<u>\$ 583,926</u>	<u>\$ 439,005</u>	<u>\$ 560,820</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location Lalamilo Wells Project Code: (leave blank)

Capacity (MW)	<u>50</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>22.06</u>	Extent (# of units)	<u>33</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	306,667	278,788	250,909
Expected Losses (%)	16%	21%	26%
Net Energy (MWh/yr)	<u>256,682</u>	<u>219,408</u>	<u>184,921</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	37,110,150	41,233,500	47,418,525
Foundations	3,015,640	3,077,184	3,138,728
Assembly & Checkout	1,293,600	1,320,000	1,346,400
Electrical Infrastructure	4,007,447	4,089,231	4,171,016
Sub-Station	2,450,000	2,500,000	2,550,000
Overseas Shipping	1,617,000	1,650,000	1,683,000
Legal Fees & Permitting	386,987	483,734	604,668

*General Facilities*

Roads & Grading	408,958	417,304	425,650
Control System	194,040	198,000	201,960
Control Buildings	116,424	118,800	121,176
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	3,491,658	3,862,415	4,263,864
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<i>Project Contingency</i>	4,333,804	4,723,181	5,282,959
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<i>Initial Costs</i>	3,109,995	3,386,311	3,837,727
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SUB-TOTAL	<u>\$61,616,343</u>	<u>\$67,149,261</u>	<u>\$75,157,672</u>
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**TRANSMISSION**

Cost of Upgrade	<u>1,960,000</u>	<u>2,000,000</u>	<u>2,040,000</u>
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**ANNUAL EXPENSES**

Variable O&M	452,786	430,039	398,690
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Fixed O&M	444,230	224,359	453,205
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Land Lease	66,462	69,960	73,458
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FIRST YEAR O&M	<u>\$ 963,479</u>	<u>\$ 724,357</u>	<u>\$ 925,353</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location North Kohala Project Code: (leave blank)

Capacity (MW)	<u>5</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>23.43</u>	Extent (# of units)	<u>3</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	29,855	27,141	24,427
Expected Losses (%)	9%	14%	19%
Net Energy (MWh/yr)	<u>27,258</u>	<u>23,423</u>	<u>19,859</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	3,614,625	4,016,250	4,618,688
Foundations	301,564	307,718	313,873
Assembly & Checkout	117,600	120,000	122,400
Electrical Infrastructure	364,313	371,748	379,183
Sub-Station	245,000	250,000	255,000
Overseas Shipping	147,000	150,000	153,000
Legal Fees & Permitting	288,269	360,337	450,421

*General Facilities*

Roads & Grading	47,381	48,348	49,315
Control System	17,640	18,000	18,360
Control Buildings	10,584	10,800	11,016
Central Building	37,620	41,800	52,250

<i>Engineering &amp; Overhead</i>	355,486	398,650	440,480
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<i>Project Contingency</i>	443,767	487,492	549,119
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<i>Initial Costs</i>	311,212	343,259	385,417
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SUB-TOTAL	<u>\$ 6,302,061</u>	<u>\$ 6,924,402</u>	<u>\$ 7,798,520</u>
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**TRANSMISSION**

Cost of Upgrade	<u>352,800</u>	<u>360,000</u>	<u>367,200</u>
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**ANNUAL EXPENSES**

Variable O&M	48,083	45,909	42,817
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Fixed O&M	40,385	20,396	41,200
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Land Lease	18,126	19,080	20,034
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FIRST YEAR O&M	<u>\$ 106,594</u>	<u>\$ 85,385</u>	<u>\$ 104,051</u>
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**TECHNOLOGY: Wind**

Island Hawaii Location North Kohala Project Code: (leave blank)

Capacity (MW)	<u>15</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>23.43</u>	Extent (# of units)	<u>10</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	99,516	90,469	81,422
Expected Losses (%)	9%	14%	19%
Net Energy (MWh/yr)	<u>90,860</u>	<u>78,077</u>	<u>66,198</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	11,475,000	12,750,000	14,662,500
Foundations	1,005,213	1,025,728	1,046,243
Assembly & Checkout	392,000	400,000	408,000
Electrical Infrastructure	1,214,378	1,239,161	1,263,944
Sub-Station	735,000	750,000	765,000
Overseas Shipping	490,000	500,000	510,000
Legal Fees & Permitting	311,597	389,497	486,871

*General Facilities*

Roads & Grading	145,199	148,162	151,125
Control System	58,800	60,000	61,200
Control Buildings	35,280	36,000	36,720
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	1,093,623	1,217,170	1,339,979
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<i>Project Contingency</i>	1,362,938	1,488,425	1,667,487
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<i>Initial Costs</i>	981,440	1,116,417	1,209,906
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SUB-TOTAL	<u>\$19,381,109</u>	<u>\$21,210,161</u>	<u>\$23,720,975</u>
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**TRANSMISSION**

Cost of Upgrade	<u>2,940,000</u>	<u>3,000,000</u>	<u>3,060,000</u>
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**ANNUAL EXPENSES**

Variable O&M	160,277	153,030	142,723
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Fixed O&M	134,615	67,988	137,335
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Land Lease	60,420	63,600	66,780
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FIRST YEAR O&M	<u>\$ 355,313</u>	<u>\$ 284,618</u>	<u>\$ 346,838</u>
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**TECHNOLOGY: Wind**

Island Maui Location NW Haleakala Project Code: (leave blank)

Capacity (MW)	<u>10</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>17.42</u>	Extent (# of units)	<u>6</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	40,960	37,237	33,513
Expected Losses (%)	9%	14%	19%
Net Energy (MWh/yr)	<u>37,398</u>	<u>32,136</u>	<u>27,247</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	6,885,000	7,650,000	8,797,500
Foundations	548,298	559,488	570,678
Assembly & Checkout	235,200	240,000	244,800
Electrical Infrastructure	728,627	743,497	758,367
Sub-Station	490,000	500,000	510,000
Overseas Shipping	294,000	300,000	306,000
Legal Fees & Permitting	298,041	372,552	465,689

*General Facilities*

Roads & Grading	78,822	80,431	82,039
Control System	35,280	36,000	36,720
Control Buildings	21,168	21,600	22,032
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	663,542	741,522	815,712
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<i>Project Contingency</i>	828,689	906,775	1,017,723
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<i>Initial Costs</i>	583,899	629,848	723,295
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SUB-TOTAL	<u>\$11,771,207</u>	<u>\$12,871,312</u>	<u>\$14,462,555</u>
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**TRANSMISSION**

Cost of Upgrade	<u></u>	<u></u>	<u></u>
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**ANNUAL EXPENSES**

Variable O&M	65,970	62,987	58,744
Fixed O&M	80,769	40,793	82,401
Land Lease	36,252	38,160	40,068

FIRST YEAR O&M	<u>\$ 182,991</u>	<u>\$ 141,939</u>	<u>\$ 181,213</u>
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**TECHNOLOGY: Wind**

Island Maui Location NW Haleakala Project Code: (leave blank)

Capacity (MW)	<u>30</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>17.42</u>	Extent (# of units)	<u>20</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	136,535	124,123	111,710
Expected Losses (%)	16%	21%	26%
Net Energy (MWh/yr)	<u>114,281</u>	<u>97,685</u>	<u>82,331</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	22,950,000	25,500,000	29,325,000
Foundations	1,827,661	1,864,960	1,902,259
Assembly & Checkout	784,000	800,000	816,000
Electrical Infrastructure	2,428,756	2,478,322	2,527,888
Sub-Station	1,470,000	1,500,000	1,530,000
Overseas Shipping	980,000	1,000,000	1,020,000
Legal Fees & Permitting	344,960	431,200	539,000

*General Facilities*

Roads & Grading	250,004	255,106	260,208
Control System	117,600	120,000	122,400
Control Buildings	70,560	72,000	73,440
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	2,154,976	2,387,783	2,636,210
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<i>Project Contingency</i>	2,676,733	2,919,918	3,269,152
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<i>Initial Costs</i>	1,921,499	2,130,883	2,377,248
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SUB-TOTAL	<u>\$38,057,388</u>	<u>\$41,549,772</u>	<u>\$46,510,806</u>
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**TRANSMISSION**

Cost of Upgrade	<u>2,940,000</u>	<u>3,000,000</u>	<u>3,060,000</u>
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**ANNUAL EXPENSES**

Variable O&M	201,591	191,463	177,506
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Fixed O&M	269,231	135,975	274,670
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Land Lease	120,840	127,200	133,560
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FIRST YEAR O&M	<u>\$ 591,661</u>	<u>\$ 454,638</u>	<u>\$ 585,736</u>
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**TECHNOLOGY: Wind**

Island Maui Location NW Haleakala Project Code: (leave blank)

Capacity (MW)	<u>50</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>17.42</u>	Extent (# of units)	<u>33</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	225,283	204,802	184,322
Expected Losses (%)	16%	21%	26%
Net Energy (MWh/yr)	<u>188,563</u>	<u>161,181</u>	<u>135,846</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	37,110,150	41,233,500	47,418,525
Foundations	3,015,640	3,077,184	3,138,728
Assembly & Checkout	1,293,600	1,320,000	1,346,400
Electrical Infrastructure	4,007,447	4,089,231	4,171,016
Sub-Station	2,450,000	2,500,000	2,550,000
Overseas Shipping	1,617,000	1,650,000	1,683,000
Legal Fees & Permitting	386,987	483,734	604,668

*General Facilities*

Roads & Grading	408,958	417,304	425,650
Control System	194,040	198,000	201,960
Control Buildings	116,424	118,800	121,176
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	3,491,658	3,862,415	4,263,864
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<i>Project Contingency</i>	4,333,804	4,723,181	5,282,959
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<i>Initial Costs</i>	3,113,186	3,412,760	3,848,005
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SUB-TOTAL	<u>\$61,619,533</u>	<u>\$67,175,710</u>	<u>\$75,167,950</u>
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**TRANSMISSION**

Cost of Upgrade	<u>2,940,000</u>	<u>3,000,000</u>	<u>3,060,000</u>
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**ANNUAL EXPENSES**

Variable O&M	332,625	315,914	292,885
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Fixed O&M	444,230	224,359	453,205
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Land Lease	199,386	209,880	220,374
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FIRST YEAR O&M	<u>\$ 976,241</u>	<u>\$ 750,153</u>	<u>\$ 966,464</u>
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**TECHNOLOGY: Wind**

Island Maui Location Puunene Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>10</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>14.65</u>	Extent (# of units)	<u>6</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	OPTIMISTIC	NOMINAL	CONSERVATIVE
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	30,603	27,821	25,039
Expected Losses (%)	9%	14%	19%
Net Energy (MWh/yr)	<u>27,941</u>	<u>24,010</u>	<u>20,357</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	6,885,000	7,650,000	8,797,500
Foundations	603,128	615,437	627,746
Assembly & Checkout	235,200	240,000	244,800
Electrical Infrastructure	728,627	743,497	758,367
Sub-Station	490,000	500,000	510,000
Overseas Shipping	294,000	300,000	306,000
Legal Fees & Permitting	298,175	372,718	465,898

*General Facilities*

Roads & Grading	89,303	91,125	92,948
Control System	35,280	36,000	36,720
Control Buildings	21,168	21,600	22,032
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	667,389	746,198	819,722
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<i>Project Contingency</i>	834,233	912,494	1,023,498
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<i>Initial Costs</i>	574,996	620,843	714,267
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SUB-TOTAL	<u>\$11,837,138</u>	<u>\$12,939,512</u>	<u>\$14,531,497</u>
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**TRANSMISSION**

Cost of Upgrade	<u>                    </u>	<u>                    </u>	<u>                    </u>
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**ANNUAL EXPENSES**

Variable O&M	49,289	47,060	43,890
Fixed O&M	80,769	40,793	82,401
Land Lease	12,084	12,720	13,356
FIRST YEAR O&M	<u>\$ 142,142</u>	<u>\$ 100,572</u>	<u>\$ 139,647</u>

**TECHNOLOGY: Wind**

Island Maui Location Puunene Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>30</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>14.65</u>	Extent (# of units)	<u>20</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	OPTIMISTIC	NOMINAL	CONSERVATIVE
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	102,010	92,737	83,463
Expected Losses (%)	16%	21%	26%
Net Energy (MWh/yr)	<u>85,383</u>	<u>72,984</u>	<u>61,513</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	22,950,000	25,500,000	29,325,000
Foundations	2,010,427	2,051,456	2,092,485
Assembly & Checkout	784,000	800,000	816,000
Electrical Infrastructure	2,428,756	2,478,322	2,527,888
Sub-Station	1,470,000	1,500,000	1,530,000
Overseas Shipping	980,000	1,000,000	1,020,000
Legal Fees & Permitting	345,404	431,755	539,694

*General Facilities*

Roads & Grading	284,939	290,754	296,569
Control System	117,600	120,000	122,400
Control Buildings	70,560	72,000	73,440
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	2,167,801	2,403,372	2,649,575
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<i>Project Contingency</i>	2,695,210	2,938,981	3,288,404
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<i>Initial Costs</i>	1,892,978	2,102,034	2,348,312
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SUB-TOTAL	<u>\$38,278,315</u>	<u>\$41,778,274</u>	<u>\$46,741,768</u>
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**TRANSMISSION**

Cost of Upgrade	<u>2,940,000</u>	<u>3,000,000</u>	<u>3,060,000</u>
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**ANNUAL EXPENSES**

Variable O&M	150,616	143,049	132,622
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Fixed O&M	269,231	135,975	274,670
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Land Lease	40,280	42,400	44,520
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FIRST YEAR O&M	<u>\$ 460,127</u>	<u>\$ 321,424</u>	<u>\$ 451,811</u>
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**TECHNOLOGY: Wind**

Island Oahu Location Kahuku Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>30</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>17.53</u>	Extent (# of units)	<u>20</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	127,074	115,522	103,970
Expected Losses (%)	16%	21%	26%
Net Energy (MWh/yr)	<u>106,362</u>	<u>90,917</u>	<u>76,626</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	22,950,000	25,500,000	29,325,000
Foundations	2,010,427	2,051,456	2,092,485
Assembly & Checkout	784,000	800,000	816,000
Electrical Infrastructure	2,752,590	2,808,765	2,864,940
Sub-Station	1,470,000	1,500,000	1,530,000
Overseas Shipping	980,000	1,000,000	1,020,000
Legal Fees & Permitting	346,141	432,676	540,846

*General Facilities*

Roads & Grading	322,203	328,779	335,354
Control System	117,600	120,000	122,400
Control Buildings	70,560	72,000	73,440
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	2,190,521	2,429,229	2,673,249
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<i>Project Contingency</i>	2,725,975	2,970,600	3,320,457
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<i>Initial Costs</i>	1,929,606	2,097,408	2,386,258
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SUB-TOTAL	<u>\$38,730,263</u>	<u>\$42,200,514</u>	<u>\$47,212,430</u>
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**TRANSMISSION**

Cost of Upgrade	<u>882,000</u>	<u>900,000</u>	<u>918,000</u>
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**ANNUAL EXPENSES**

Variable O&M	187,623	178,197	165,207
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Fixed O&M	269,231	135,975	274,670
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Land Lease	120,840	127,200	133,560
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FIRST YEAR O&M	<u>\$ 577,693</u>	<u>\$ 441,372</u>	<u>\$ 573,436</u>
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**TECHNOLOGY: Wind**

Island <u>Oahu</u>	Location <u>Kahuku</u>	Project Code: _____ (leave blank)
Capacity (MW)	<u>50</u>	Stage (current/future) <u>Future</u>
Resource (mph, avg.)	<u>17.53</u>	Extent (# of units) <u>33</u>
Project Life (years)	<u>30</u>	Construction Time (years) <u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	209,673	190,612	171,551
Expected Losses (%)	16%	21%	26%
Net Energy (MWh/yr)	<u>175,497</u>	<u>150,012</u>	<u>126,434</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	37,110,150	41,233,500	47,418,525
Foundations	3,317,204	3,384,902	3,452,600
Assembly & Checkout	1,293,600	1,320,000	1,346,400
Electrical Infrastructure	4,541,773	4,634,462	4,727,151
Sub-Station	2,450,000	2,500,000	2,550,000
Overseas Shipping	1,617,000	1,650,000	1,683,000
Legal Fees & Permitting	388,936	486,170	607,713

*General Facilities*

Roads & Grading	528,087	538,864	549,641
Control System	194,040	198,000	201,960
Control Buildings	116,424	118,800	121,176
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	3,550,306	3,930,801	4,324,977
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<i>Project Contingency</i>	4,415,053	4,806,808	5,367,612
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<i>Initial Costs</i>	3,126,563	3,406,827	3,862,872
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SUB-TOTAL	<u>\$62,729,777</u>	<u>\$68,298,735</u>	<u>\$76,325,628</u>
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**TRANSMISSION**

Cost of Upgrade	<u>1,960,000</u>	<u>2,000,000</u>	<u>2,040,000</u>
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**ANNUAL EXPENSES**

Variable O&M	309,577	294,024	272,591
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Fixed O&M	444,230	224,359	453,205
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Land Lease	199,386	209,880	220,374
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FIRST YEAR O&M	<u>\$ 953,194</u>	<u>\$ 728,263</u>	<u>\$ 946,170</u>
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**TECHNOLOGY: Wind**

Island Oahu Location Kahuku Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>80</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>17.53</u>	Extent (# of units)	<u>53</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	336,747	306,134	275,521
Expected Losses (%)	16%	21%	26%
Net Energy (MWh/yr)	<u>281,859</u>	<u>240,929</u>	<u>203,060</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	59,601,150	66,223,500	76,157,025
Foundations	5,327,631	5,436,358	5,545,086
Assembly & Checkout	2,077,600	2,120,000	2,162,400
Electrical Infrastructure	7,294,363	7,443,227	7,592,092
Sub-Station	3,920,000	4,000,000	4,080,000
Overseas Shipping	2,597,000	2,650,000	2,703,000
Legal Fees & Permitting	456,267	570,334	712,917

*General Facilities*

Roads & Grading	844,831	862,073	879,314
Control System	311,640	318,000	324,360
Control Buildings	186,984	190,800	194,616
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	5,689,181	6,293,272	6,926,676
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<i>Project Contingency</i>	7,070,983	7,695,773	8,591,159
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<i>Initial Costs</i>	5,016,741	5,581,662	6,197,009
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SUB-TOTAL	<u>\$100,475,011</u>	<u>\$109,474,599</u>	<u>\$122,177,654</u>
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**TRANSMISSION**

Cost of Upgrade	<u>8,820,000</u>	<u>9,000,000</u>	<u>9,180,000</u>
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**ANNUAL EXPENSES**

Variable O&M	497,200	472,221	437,798
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Fixed O&M	713,461	360,334	727,874
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Land Lease	320,226	337,080	353,934
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FIRST YEAR O&M	<u>\$ 1,530,887</u>	<u>\$ 1,169,635</u>	<u>\$ 1,519,606</u>
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**TECHNOLOGY: Wind**

Island Oahu Location Kaena Point Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>3</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>16.74</u>	Extent (# of units)	<u>2</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	OPTIMISTIC	NOMINAL	CONSERVATIVE
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	12,085	10,986	9,887
Expected Losses (%)	9%	14%	19%
Net Energy (MWh/yr)	<u>11,034</u>	<u>9,481</u>	<u>8,039</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	2,409,750	2,677,500	3,079,125
Foundations	182,766	186,496	190,226
Assembly & Checkout	78,400	80,000	81,600
Electrical Infrastructure	323,834	330,443	337,052
Sub-Station	147,000	150,000	153,000
Overseas Shipping	98,000	100,000	102,000
Legal Fees & Permitting	284,789	355,986	444,982

*General Facilities*

Roads & Grading	38,065	38,841	39,618
Control System	11,760	12,000	12,240
Control Buildings	7,056	7,200	7,344
Central Building	10,710	11,900	14,875

<i>Engineering &amp; Overhead</i>	246,718	276,526	307,159
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<i>Project Contingency</i>	307,108	338,151	381,538
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<i>Initial Costs</i>	204,934	221,987	255,510
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SUB-TOTAL	<u>\$ 4,350,889</u>	<u>\$ 4,787,031</u>	<u>\$ 5,406,269</u>
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**TRANSMISSION**

Cost of Upgrade	<u>                    </u>	<u>                    </u>	<u>                    </u>
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**ANNUAL EXPENSES**

Variable O&M	19,463	18,583	17,331
Fixed O&M	26,923	13,598	27,467
Land Lease	4,028	4,240	4,452
FIRST YEAR O&M	<u>\$ 50,414</u>	<u>\$ 36,421</u>	<u>\$ 49,250</u>

**TECHNOLOGY: Wind**

Island Oahu Location Kaena Point Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>15</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>16.74</u>	Extent (# of units)	<u>10</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	60,423	54,930	49,437
Expected Losses (%)	13%	18%	23%
Net Energy (MWh/yr)	<u>52,736</u>	<u>45,195</u>	<u>38,204</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	11,475,000	12,750,000	14,662,500
Foundations	913,830	932,480	951,130
Assembly & Checkout	392,000	400,000	408,000
Electrical Infrastructure	1,619,170	1,652,215	1,685,259
Sub-Station	735,000	750,000	765,000
Overseas Shipping	490,000	500,000	510,000
Legal Fees & Permitting	312,284	390,356	487,944

*General Facilities*

Roads & Grading	168,489	171,927	175,366
Control System	58,800	60,000	61,200
Control Buildings	35,280	36,000	36,720
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	1,115,610	1,241,280	1,362,888
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<i>Project Contingency</i>	1,391,688	1,517,909	1,697,441
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<i>Initial Costs</i>	961,305	1,066,594	1,190,718
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SUB-TOTAL	<u>\$19,749,098</u>	<u>\$21,558,361</u>	<u>\$24,106,166</u>
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**TRANSMISSION**

Cost of Upgrade	<u>1,470,000</u>	<u>1,500,000</u>	<u>1,530,000</u>
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**ANNUAL EXPENSES**

Variable O&M	93,027	88,583	82,368
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Fixed O&M	134,615	67,988	137,335
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Land Lease	20,140	21,200	22,260
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FIRST YEAR O&M	<u>\$ 247,782</u>	<u>\$ 177,771</u>	<u>\$ 241,963</u>
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**TECHNOLOGY: Wind**

Island Kauai Location N. Hanapepe Project Code: (leave blank)

Capacity (MW)	<u>10</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>17.08</u>	Extent (# of units)	<u>6</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	34,667	31,515	28,364
Expected Losses (%)	9%	14%	19%
Net Energy (MWh/yr)	<u>31,651</u>	<u>27,198</u>	<u>23,060</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	6,885,000	7,650,000	8,797,500
Foundations	603,128	615,437	627,746
Assembly & Checkout	235,200	240,000	244,800
Electrical Infrastructure	971,502	991,329	1,011,155
Sub-Station	490,000	500,000	510,000
Overseas Shipping	294,000	300,000	306,000
Legal Fees & Permitting	298,727	373,409	466,761

*General Facilities*

Roads & Grading	117,251	119,644	122,036
Control System	35,280	36,000	36,720
Control Buildings	21,168	21,600	22,032
Central Building	80,640	89,600	112,000

<i>Engineering &amp; Overhead</i>	684,429	765,591	837,477
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<i>Project Contingency</i>	857,306	936,209	1,047,538
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<i>Initial Costs</i>	588,101	634,306	728,057
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SUB-TOTAL	<u>\$12,161,733</u>	<u>\$13,273,124</u>	<u>\$14,869,823</u>
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**TRANSMISSION**

Cost of Upgrade	<u></u>	<u></u>	<u></u>
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**ANNUAL EXPENSES**

Variable O&M	55,833	53,309	49,718
Fixed O&M	80,769	40,793	82,401
Land Lease	36,252	38,160	40,068
FIRST YEAR O&M	<u>\$ 172,854</u>	<u>\$ 132,261</u>	<u>\$ 172,187</u>

**TECHNOLOGY: Wind**

Island Kauai Location Port Allen Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>5</u>	Stage (current/future)	<u>Future</u>
Resource (mph, avg.)	<u>15.8</u>	Extent (# of units)	<u>3</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

	OPTIMISTIC	NOMINAL	CONSERVATIVE
<b>ENERGY PRODUCTION</b>			
Gross Energy (MWh/yr)	16,037	14,579	13,121
Expected Losses (%)	9%	14%	19%
Net Energy (MWh/yr)	<u>14,642</u>	<u>12,582</u>	<u>10,668</u>

**CAPITAL COSTS***Process Capital*

Turbines & Towers	3,614,625	4,016,250	4,618,688
Foundations	274,149	279,744	285,339
Assembly & Checkout	117,600	120,000	122,400
Electrical Infrastructure	364,313	371,748	379,183
Sub-Station	245,000	250,000	255,000
Overseas Shipping	147,000	150,000	153,000
Legal Fees & Permitting	288,203	360,253	450,317

*General Facilities*

Roads & Grading	42,140	43,000	43,860
Control System	17,640	18,000	18,360
Control Buildings	10,584	10,800	11,016
Central Building	37,620	41,800	52,250

<i>Engineering &amp; Overhead</i>	353,562	396,312	438,475
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<i>Project Contingency</i>	440,995	484,633	546,231
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<i>Initial Costs</i>	301,972	326,899	376,442
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SUB-TOTAL	<u>\$ 6,255,404</u>	<u>\$ 6,869,439</u>	<u>\$ 7,750,561</u>
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**TRANSMISSION**

Cost of Upgrade	<u>                    </u>	<u>                    </u>	<u>                    </u>
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**ANNUAL EXPENSES**

Variable O&M	25,828	24,661	22,999
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Fixed O&M	40,385	20,396	41,200
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Land Lease	6,042	6,360	6,678
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FIRST YEAR O&M	<u>\$ 72,255</u>	<u>\$ 51,417</u>	<u>\$ 70,878</u>
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**TECHNOLOGY: Photovoltaics (fixed, tilted at 15°)**

Island Oahu Location: Pearl Harbor Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW) 5 Stage (current/future) current  
 Resource (kWh/m<sup>2</sup>) 2,068 Extent (PV module area, m<sup>2</sup>) 48,400  
 Project Life (years) 30 Construction Time (years) 1

OPTIMISTIC	NOMINAL	CONSERVATIVE
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**ENERGY PRODUCTION**

Gross Energy (MWh/yr)	11,912	10,360	9,327
Expected Losses (%)	0.98%	1.00%	1.03%
Net Energy (MWh/yr)	<b>11,795</b>	<b>10,257</b>	<b>9,231</b>

**CAPITAL COSTS***Process Capital*

PV Modules	\$14,580,000	\$16,200,000	\$17,010,000
Array Structure & Foundations	\$2,865,347	\$3,016,155	\$3,166,963
Power Conditioning Units	\$966,875	\$1,487,500	\$1,561,875
Electrical & SCADA	\$2,125,717	\$2,147,189	\$2,168,661
Substation	\$277,555	\$292,163	\$306,771
Overseas Shipping	\$180,983	\$190,508	\$200,034
Legal Fees & Permitting	\$578,027	\$722,534	\$903,167

*General Facilities*

Roads and Grading	\$337,872	\$375,414	\$412,955
Buildings and Fencing	\$125,727	\$139,697	\$153,666

*Engineering & Overhead*

\$1,924,484	\$1,924,484	\$1,924,484
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*Project Contingency*

\$2,252,130	\$2,252,130	\$2,252,130
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*Initial Costs*

\$365,630	\$365,630	\$365,630
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**SUB-TOTAL**

<b>\$26,580,347</b>	<b>\$29,113,403</b>	<b>\$30,426,336</b>
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**TRANSMISSION**

## Cost of Upgrade

<b>\$950,000</b>	<b>\$1,000,000</b>	<b>\$1,050,000</b>
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**ANNUAL EXPENSES**

Variable O&M	\$14,539	\$16,154	\$17,770
Fixed O&M	\$23,156	\$24,375	\$25,594
Land Lease	\$16,098	\$16,945	\$17,792

**FIRST YEAR O&M**

<b>\$53,793</b>	<b>\$57,474</b>	<b>\$61,156</b>
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**TECHNOLOGY: Photovoltaics (fixed, tilted at 15°)**

Island Oahu Location: Pearl Harbor Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW) 5 Stage (current/future) future  
 Resource (kWh/m<sup>2</sup>) 2,068 Extent (PV module area, m<sup>2</sup>) 38,320  
 Project Life (years) 30 Construction Time (years) 1

OPTIMISTIC	NOMINAL	CONSERVATIVE
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**ENERGY PRODUCTION**

Gross Energy (MWh/yr)	12,357	10,751	9,679
Expected Losses (%)	0.95%	1.00%	1.03%
Net Energy (MWh/yr)	<b>12,240</b>	<b>10,643</b>	<b>9,579</b>

**CAPITAL COSTS***Process Capital*

PV Modules	\$10,206,000	\$11,340,000	\$11,907,000
Array Structure & Foundations	\$2,063,050	\$2,171,632	\$2,280,213
Power Conditioning Units	\$435,094	\$669,375	\$702,844
Electrical & SCADA	\$1,676,128	\$1,693,058	\$1,709,989
Substation	\$277,555	\$292,163	\$306,771
Overseas Shipping	\$162,885	\$171,458	\$180,030
Legal Fees & Permitting	\$564,035	\$705,044	\$881,305

*General Facilities*

Roads and Grading	\$270,298	\$300,331	\$330,364
Buildings and Fencing	\$118,069	\$131,188	\$144,306

*Engineering & Overhead*

	\$1,295,247	\$1,295,247	\$1,295,247
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*Project Contingency*

	\$1,595,407	\$1,595,407	\$1,595,407
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*Initial Costs*

	\$259,945	\$259,945	\$259,945
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SUB-TOTAL	<b>\$18,923,713</b>	<b>\$20,624,848</b>	<b>\$21,593,423</b>
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**TRANSMISSION**

Cost of Upgrade	<b>\$950,000</b>	<b>\$1,000,000</b>	<b>\$1,050,000</b>
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**ANNUAL EXPENSES**

Variable O&M	\$13,616	\$15,129	\$16,642
Fixed O&M	\$21,943	\$23,098	\$24,253
Land Lease	\$12,747	\$13,418	\$14,089

**FIRST YEAR O&M**

	<b>\$48,307</b>	<b>\$51,645</b>	<b>\$54,984</b>
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**TECHNOLOGY: Photovoltaics (fixed, tilted at 15°)**

Island Hawaii Location: N. Kohala Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW)	<u>5</u>	Stage (current/future)	<u>current</u>
Resource (kWh/m <sup>2</sup> )	<u>2,358</u>	Extent (PV module area, m <sup>2</sup> )	<u>48,400</u>
Project Life (years)	<u>30</u>	Construction Time (years)	<u>1</u>

OPTIMISTIC	NOMINAL	CONSERVATIVE
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**ENERGY PRODUCTION**

Gross Energy (MWh/yr)	11,912	10,360	9,327
Expected Losses (%)	0.98%	1.00%	1.03%
Net Energy (MWh/yr)	<b>11,795</b>	<b>10,257</b>	<b>9,231</b>

**CAPITAL COSTS***Process Capital*

PV Modules	\$14,580,000	\$16,200,000	\$17,010,000
Array Structure & Foundations	\$2,865,347	\$3,016,155	\$3,166,963
Power Conditioning Units	\$966,875	\$1,487,500	\$1,561,875
Electrical & SCADA	\$2,125,717	\$2,147,189	\$2,168,661
Substation	\$277,555	\$292,163	\$306,771
Overseas Shipping	\$180,983	\$190,508	\$200,034
Legal Fees & Permitting	\$578,027	\$722,534	\$903,167

*General Facilities*

Roads and Grading	\$337,872	\$375,414	\$412,955
Buildings and Fencing	\$125,727	\$139,697	\$153,666

*Engineering & Overhead*

	\$1,924,484	\$1,924,484	\$1,924,484
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*Project Contingency*

	\$2,252,130	\$2,252,130	\$2,252,130
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*Initial Costs*

	\$364,924	\$364,924	\$364,924
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SUB-TOTAL	<b>\$26,579,641</b>	<b>\$29,112,697</b>	<b>\$30,425,630</b>
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**TRANSMISSION**

Cost of Upgrade	<b>\$352,800</b>	<b>\$360,000</b>	<b>\$367,200</b>
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**ANNUAL EXPENSES**

Variable O&M	\$14,539	\$16,154	\$17,770
Fixed O&M	\$23,156	\$24,375	\$25,594
Land Lease	\$8,049	\$8,472	\$8,896

**FIRST YEAR O&M**

	<b>\$45,744</b>	<b>\$49,002</b>	<b>\$52,259</b>
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**TECHNOLOGY: Photovoltaics (fixed, tilted at 15°)**

Island Hawaii Location: N. Kohala Project Code: \_\_\_\_\_  
(leave blank)

Capacity (MW) 5 Stage (current/future) future  
Resource (kWh/m<sup>2</sup>) 2,358 Extent (PV module area, m<sup>2</sup>) 38,320  
Project Life (years) 30 Construction Time (years) 1

OPTIMISTIC	NOMINAL	CONSERVATIVE
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**ENERGY PRODUCTION**

Gross Energy (MWh/yr)	12,357	10,751	9,679
Expected Losses (%)	0.95%	1.00%	1.03%
Net Energy (MWh/yr)	<b>12,240</b>	<b>10,643</b>	<b>9,579</b>

**CAPITAL COSTS***Process Capital*

PV Modules	\$10,206,000	\$11,340,000	\$11,907,000
Array Structure & Foundations	\$2,063,050	\$2,171,632	\$2,280,213
Power Conditioning Units	\$435,094	\$669,375	\$702,844
Electrical & SCADA	\$1,676,128	\$1,693,058	\$1,709,989
Substation	\$277,555	\$292,163	\$306,771
Overseas Shipping	\$162,885	\$171,458	\$180,030
Legal Fees & Permitting	\$564,035	\$705,044	\$881,305
<i>General Facilities</i>			
Roads and Grading	\$270,298	\$300,331	\$330,364
Buildings and Fencing	\$118,069	\$131,188	\$144,306
<i>Engineering &amp; Overhead</i>	\$1,295,247	\$1,295,247	\$1,295,247
<i>Project Contingency</i>	\$1,595,407	\$1,595,407	\$1,595,407
<i>Initial Costs</i>	\$259,386	\$259,386	\$259,386
<b>SUB-TOTAL</b>	<b>\$18,923,153</b>	<b>\$20,624,289</b>	<b>\$21,592,863</b>

**TRANSMISSION**

Cost of Upgrade	<b>\$352,800</b>	<b>\$360,000</b>	<b>\$367,200</b>
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**ANNUAL EXPENSES**

Variable O&M	\$13,616	\$15,129	\$16,642
Fixed O&M	\$21,943	\$23,098	\$24,253
Land Lease	\$6,374	\$6,709	\$7,044

**FIRST YEAR O&M**

<b>\$41,933</b>	<b>\$44,936</b>	<b>\$47,940</b>
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**TECHNOLOGY: Hydroelectric**

Island Hawaii Location: Umauma Stream Project Code: \_\_\_\_\_

Capacity (MW)	<u>13.8</u>	Stage (current/future)	<u>current</u>
Resource (cfs, max)	<u>260</u>	Extent (feet of head)	<u>835</u>
Project Life (years)	<u>50</u>	Construction Time (years)	<u>2</u>

<b>ENERGY PRODUCTION</b>	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
Gross Energy (MWh/yr)	42,952	42,093	41,663
Expected Losses (%)	4.50%	4.50%	4.50%
Net Energy (MWh/yr)	<b>41,019</b>	<b>40,199</b>	<b>39,788</b>

**CAPITAL COSTS**

*Process Capital*

Intake Structure	\$244,405	\$256,728	\$269,565
Penstock	\$7,048,307	\$7,403,684	\$7,773,868
Tailrace	\$332,978	\$349,767	\$367,255
Diversion Structure	\$1,773,418	\$1,862,834	\$1,955,976
Powerhouse	\$1,224,664	\$1,286,412	\$1,350,732
Turbine	\$2,268,007	\$2,382,360	\$2,501,478
Generator	\$3,041,197	\$3,194,535	\$3,354,262
Switchgear	\$636,616	\$668,714	\$702,150
Equipment Installation	\$209,426	\$219,985	\$230,984
Interconnection	\$1,020,498	\$1,071,952	\$1,125,549
Legal Fees & Permitting	\$637,346	\$669,481	\$702,955
Environmental Monitoring	\$435,272	\$457,219	\$480,080

*General Capital Facilities*

Access Road	\$629,018	\$660,733	\$693,770
Station Service	\$209,426	\$219,985	\$230,984
Telecommunications	\$55,623	\$58,427	\$61,349

*Engineering Services*

Engineering	\$1,581,296	\$1,661,025	\$1,744,077
Construction Management	\$1,581,296	\$1,661,025	\$1,744,077
Post Construction Environmental	\$98,499	\$103,465	\$108,638

*Project Contingency*

<b>SUB-TOTAL</b>	<b>\$25,330,022</b>	<b>\$26,607,166</b>	<b>\$27,937,524</b>
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**TRANSMISSION**

Cost of Upgrade	<b>\$1,000,000</b>	<b>\$1,000,000</b>	<b>\$1,000,000</b>
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**ANNUAL EXPENSES**

Variable O&M	\$82,855	\$87,033	\$91,384
Fixed O&M	\$79,260	\$83,256	\$87,419
Rep. Spare Parts (sinking fund)	\$25,330	\$26,608	\$27,938
Land Lease	\$24,335	\$25,562	\$26,840
Federal Fees	\$10,545	\$11,077	\$11,631
<b>FIRST YEAR O&amp;M</b>	<b>\$222,325</b>	<b>\$233,535</b>	<b>\$245,212</b>

**TECHNOLOGY: Hydroelectric**

Island Hawaii Location: Umauma Stream Project Code: \_\_\_\_\_

Capacity (MW)	<u>13.8</u>	Stage (current/future)	<u>future</u>
Resource (cfs, max)	<u>260</u>	Extent (feet of head)	<u>835</u>
Project Life (years)	<u>50</u>	Construction Time (years)	<u>2</u>

<b>ENERGY PRODUCTION</b>	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
Gross Energy (MWh/yr)	42,952	42,093	41,663
Expected Losses (%)	4.50%	4.50%	4.50%
Net Energy (MWh/yr)	<b>41,019</b>	<b>40,199</b>	<b>39,788</b>

**CAPITAL COSTS**

*Process Capital*

Intake Structure	\$244,405	\$256,728	\$269,565
Penstock	\$7,048,307	\$7,403,684	\$7,773,868
Tailrace	\$332,978	\$349,767	\$367,255
Diversion Structure	\$1,773,418	\$1,862,834	\$1,955,976
Powerhouse	\$1,224,664	\$1,286,412	\$1,350,732
Turbine	\$2,268,007	\$2,382,360	\$2,501,478
Generaator	\$3,041,197	\$3,194,535	\$3,354,262
Switchgear	\$636,616	\$668,714	\$702,150
Equipment Installation	\$209,426	\$219,985	\$230,984
Interconnection	\$1,020,498	\$1,071,952	\$1,125,549
Legal Fees & Permitting	\$637,346	\$669,481	\$702,955
Environmental Monitoring	\$435,272	\$457,219	\$480,080

*General Capital Facilities*

Access Road	\$629,018	\$660,733	\$693,770
Station Service	\$209,426	\$219,985	\$230,984
Telecommunications	\$55,623	\$58,427	\$61,349

*Engineering Services*

Engineering	\$1,581,296	\$1,661,025	\$1,744,077
Construction Management	\$1,581,296	\$1,661,025	\$1,744,077
Post Construction Environmental	\$98,499	\$103,465	\$108,638

<i>Project Contingency</i>	\$2,302,729	\$2,418,833	\$2,539,775
<b>SUB-TOTAL</b>	<b>\$25,330,022</b>	<b>\$26,607,166</b>	<b>\$27,937,524</b>

**TRANSMISSION**

Cost of Upgrade	<b>\$1,000,000</b>	<b>\$1,000,000</b>	<b>\$1,000,000</b>
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**ANNUAL EXPENSES**

Variable O&M	\$82,855	\$87,033	\$91,384
Fixed O&M	\$59,445	\$62,442	\$65,564
Rep. Spare Parts (sinking fund)	\$25,330	\$26,608	\$27,938
Land Lease	\$24,335	\$25,562	\$26,840
Federal Fees	\$10,545	\$11,077	\$11,631
<b>FIRST YEAR O&amp;M</b>	<b>\$202,510</b>	<b>\$212,721</b>	<b>\$223,357</b>

**TECHNOLOGY: Hydroelectric**

Island	<u>Kauai</u>	Location:	<u>Wailua River</u>	Project Code:	<u></u>
Capacity (MW)	<u>6.6</u>	Stage (current/future)		<u>current</u>	
Resource (cfs, max)	<u>365</u>	Extent (feet of head)		<u>262</u>	
Project Life (years)	<u>50</u>	Construction Time (years)		<u>2</u>	

<b>ENERGY PRODUCTION</b>	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
Gross Energy (MWh/yr)	17,200	16,856	16,684
Expected Losses (%)	2.50%	2.50%	2.50%
Net Energy (MWh/yr)	<b>16,770</b>	<b>16,435</b>	<b>16,267</b>

**CAPITAL COSTS**

*Process Capital*

Intake Structure	\$212,526	\$223,241	\$234,403
Penstock	\$3,504,243	\$3,680,927	\$3,864,973
Tailrace	\$103,829	\$109,065	\$114,518
Diversion Structure	\$848,156	\$890,921	\$935,467
Powerhouse	\$488,091	\$512,701	\$538,336
Turbine	\$903,916	\$949,492	\$996,966
Generator	\$1,355,877	\$1,424,240	\$1,495,452
Switchgear	\$416,588	\$437,592	\$459,472
Equipment Installation	\$105,452	\$110,769	\$116,307
Interconnection	\$321,801	\$338,026	\$354,927
Legal Fees & Permitting	\$163,531	\$171,777	\$180,365
Environmental Monitoring	\$73,005	\$76,686	\$80,520

*General Capital Facilities*

Access Road	\$77,872	\$81,798	\$85,888
Sable Storm Ditch	\$97,340	\$102,248	\$107,360
Relocate USGS Gage	\$25,957	\$27,266	\$28,629
Station Service	\$97,340	\$102,248	\$107,360
Telecommunications	\$25,957	\$27,266	\$28,629

*Engineering Services*

Engineering	\$706,433	\$742,051	\$779,154
Construction Management	\$706,433	\$742,051	\$779,154
Post Construction Environmental	\$73,005	\$76,686	\$80,520

<i>Project Contingency</i>	\$1,030,735	\$1,082,705	\$1,136,840
<b>SUB-TOTAL</b>	<b>\$11,338,087</b>	<b>\$11,909,756</b>	<b>\$12,505,244</b>

**TRANSMISSION**

Cost of Upgrade	<b>\$1,000,000</b>	<b>\$1,000,000</b>	<b>\$1,000,000</b>
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**ANNUAL EXPENSES**

Variable O&M	\$94,154	\$98,901	\$103,846
Fixed O&M	\$80,233	\$84,278	\$88,492
Rep. Spare Parts (sinking fund)	\$11,349	\$11,921	\$12,517
Land Lease	\$14,485	\$15,215	\$15,976
Federal Fees	\$7,243	\$7,608	\$7,989
<b>FIRST YEAR O&amp;M</b>	<b>\$207,464</b>	<b>\$217,924</b>	<b>\$228,820</b>

**TECHNOLOGY: Hydroelectric**

Island Kauai Location: Wailua River Project Code: \_\_\_\_\_

Capacity (MW)	<u>6.6</u>	Stage (current/future)	<u>future</u>
Resource (cfs, max)	<u>365</u>	Extent (feet of head)	<u>262</u>
Project Life (years)	<u>50</u>	Construction Time (years)	<u>2</u>

<b>ENERGY PRODUCTION</b>	<b>OPTIMISTIC</b>	<b>NOMINAL</b>	<b>CONSERVATIVE</b>
Gross Energy (MWh/yr)	17,200	16,856	16,684
Expected Losses (%)	2.50%	2.50%	2.50%
Net Energy (MWh/yr)	<b>16,770</b>	<b>16,435</b>	<b>16,267</b>

**CAPITAL COSTS**

*Process Capital*

Intake Structure	\$212,526	\$223,241	\$234,403
Penstock	\$3,504,243	\$3,680,927	\$3,864,973
Tailrace	\$103,829	\$109,065	\$114,518
Diversion Structure	\$848,156	\$890,921	\$935,467
Powerhouse	\$488,091	\$512,701	\$538,336
Turbine	\$903,916	\$949,492	\$996,966
Generator	\$1,355,877	\$1,424,240	\$1,495,452
Switchgear	\$416,588	\$437,592	\$459,472
Equipment Installation	\$105,452	\$110,769	\$116,307
Interconnection	\$321,801	\$338,026	\$354,927
Legal Fees & Permitting	\$163,531	\$171,777	\$180,365
Environmental Monitoring	\$73,005	\$76,686	\$80,520

*General Capital Facilities*

Access Road	\$77,872	\$81,798	\$85,888
Sable Storm Ditch	\$97,340	\$102,248	\$107,360
Relocate USGS Gage	\$25,957	\$27,266	\$28,629
Station Service	\$97,340	\$102,248	\$107,360
Telecommunications	\$25,957	\$27,266	\$28,629

*Engineering Services*

Engineering	\$706,433	\$742,051	\$779,154
Construction Management	\$706,433	\$742,051	\$779,154
Post Construction Environmental	\$73,005	\$76,686	\$80,520

<i>Project Contingency</i>	\$1,030,735	\$1,082,705	\$1,136,840
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<b>SUB-TOTAL</b>	<b>\$11,338,087</b>	<b>\$11,909,756</b>	<b>\$12,505,244</b>
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**TRANSMISSION**

Cost of Upgrade	<b>\$1,000,000</b>	<b>\$1,000,000</b>	<b>\$1,000,000</b>
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**ANNUAL EXPENSES**

Variable O&M	\$94,154	\$98,901	\$103,846
Fixed O&M	\$60,175	\$63,209	\$66,369
Rep. Spare Parts (sinking fund)	\$11,349	\$11,921	\$12,517
Land Lease	\$14,485	\$15,215	\$15,976
Federal Fees	\$7,243	\$7,608	\$7,989
<b>FIRST YEAR O&amp;M</b>	<b>\$187,405</b>	<b>\$196,854</b>	<b>\$206,697</b>

**TECHNOLOGY: Geothermal**Island: HawaiiLocation: Kilauea  
Ownership: Puna Geothermal Venture

Project Code: \_\_\_\_\_

Capacity (MW) 8  
Resource High enthalpy  
Project Life (years) 30  
Geology Type Rift ZoneStage (current/future): Current  
Extent (# of units): 1 (Topping Unit)  
Construction Time (years): 1

	OPTIMISTIC		NOMINAL		CONSERVATIVE
<b>ENERGY PRODUCTION</b>					
Gross Energy (MWh/yr)	56,250		52,500		45,000
Expected Losses (%)	4%		8%		14%
Net Energy (MWh/yr)	54,000		48,300		38,700
<b>CAPITAL COSTS (\$)</b>					
<i>Process Capital</i>					
Exploration & Assessment	50,000		200,000		300,000
Production & Injection Wells	4,000,000		5,000,000		7,000,000
Gathering/Injection System	500,000		1,000,000		1,500,000
Power Plant	7,000,000		8,000,000		9,000,000
Substation Tie-In	50,000		100,000		150,000
Water Supply	0		0		0
Permitting, Legal, Environmental	50,000		100,000		150,000
<i>General Facilities</i>					
Roads & Site Work	50,000		100,000		150,000
Control and Office Buildings	50,000		100,000		150,000
Land Acquisition	0		0		0
<i>Engineering &amp; Overhead</i>	800,000		1,000,000		1,200,000
<i>Project Contingency</i>	1,000,000		2,000,000		2,500,000
<i>Initial Costs</i>	0		0		0
<b>TOTAL CAPITAL COSTS (\$)</b>	13,550,000		17,600,000		22,100,000
Capital Cost per kW (excluding transmission)	1,694		2,200		2,763
Capital Cost per kW (including transmission)	1,694		2,200		2,763
<b>ANNUAL EXPENSES (\$)</b>					
Variable O&M	80,000		120,000		160,000
Fixed O&M	200,000		250,000		300,000
Land Lease	0		0		0
<b>TOTAL FIRST YEAR O&amp;M</b>	280,000		370,000		460,000
O&M per KWh (mills)	5.2		7.7		11.9

**TECHNOLOGY: Geothermal**Island: HawaiiLocation: Kilauea  
Ownership: Puna Geothermal Venture

Project Code: \_\_\_\_\_

Capacity (MW) 22  
Resource High enthalpy  
Project Life (years) 30  
Geology Type Rift ZoneStage (current/future): Future (2005)  
Extent (# of units): 1  
Construction Time (years): 2

	OPTIMISTIC		NOMINAL		CONSERVATIVE
<b>ENERGY PRODUCTION</b>					
Gross Energy (MWh/yr)	200,000		193,000		170,000
Expected Losses (%)	4%		8%		14%
Net Energy (MWh/yr)	192,000		177,560		146,200
<b>CAPITAL COSTS (\$)</b>					
<i>Process Capital</i>					
Exploration & Assessment	200,000		500,000		800,000
Production & Injection Wells	9,000,000		12,000,000		15,000,000
Gathering/Injection System	2,000,000		2,500,000		3,000,000
Power Plant	25,000,000		30,000,000		35,000,000
Substation Tie-In	200,000		300,000		400,000
Water Supply	500,000		1,000,000		1,300,000
Permitting, Legal, Environmental	500,000		600,000		700,000
<i>General Facilities</i>					
Roads & Site Work	500,000		800,000		1,000,000
Control and Office Buildings	400,000		500,000		600,000
Land Acquisition	150,000		200,000		250,000
<i>Engineering &amp; Overhead</i>	4,000,000		5,000,000		6,000,000
<i>Project Contingency</i>	5,000,000		6,000,000		7,000,000
<i>Initial Costs</i>	1,000,000		2,000,000		3,000,000
<b>TOTAL CAPITAL COSTS (\$)</b>	48,450,000		61,400,000		74,050,000
Capital Cost per kW (excluding transmission)	2,202		2,791		3,366
Capital Cost per kW (including transmission)	2,222		2,816		3,396
<b>ANNUAL EXPENSES (\$)</b>					
Variable O&M	250,000		300,000		400,000
Fixed O&M	600,000		750,000		900,000
Land Lease	300,000		500,000		700,000
<b>TOTAL FIRST YEAR O&amp;M</b>	1,150,000		1,550,000		2,000,000
O&M per KWh (mills)	6.0		8.7		13.7